IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants:	Nadeem AHMED et al.	§	Confirmation No.:	3979
		§		
Serial No.:	09/865,238	§	Group Art Unit:	2661
		§		
Filed:	May 25, 2001	§	Examiner:	C. Q. Ware
		§		
For:	Joint Detection In OFDM Systems	§	Atty. Docket No.:	1789-04801
		§		

APPEAL BRIEF

Mail Stop Appeal Brief - Patents
Commissioner for Patents
PO Box 1450
Alexandria, VA 22313-1450

January 11, 2007

Sir or Madam:

In response to the final office action of August 18, 2006, appellants file this Appeal Brief.

A Notice of Appeal was filed via facsimile on November 17, 2006.

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I. REAL PARTY IN INTEREST

The real party in interest is the assignee: Wm. Marsh Rice University.

II. RELATED APPEALS AND INTERFERENCES

Neither the appellants, the appellants' legal representative, nor the assignee know of any other appeals or interferences that will directly affect, be directly affected by, or have a bearing on the Board's decision in an appeal on this case.

III. STATUS OF CLAIMS

The status of the claims is as follows:

Originally filed claims:	1–23
Canceled claims:	None
Allowed claims:	10
Currently rejected claims:	1–9, 11–23
Presently appealed claims:	1–9, 11–23

IV. STATUS OF AMENDMENTS

No amendment was filed subsequent to the final rejection.

V. SUMMARY OF CLAIMED SUBJECT MATTER

This section provides a concise explanation of the subject matter defined in each of the independent claims involved in the appeal, referring to the specification by page and line number or to the drawings by reference characters as required by 37 CFR § 41.37(c)(1)(v). Each element of the claims is identified with a corresponding reference to the specification or drawings where applicable. Note that the citation to passages in the specification or drawings for each claim element does not imply that the limitations from the specification and drawings should be read into the corresponding claim element.

Appellants disclose a communications system having an improved receiver designed to combat inter-channel interference ("ICI") in orthogonal frequency division multiplexing ("OFDM") modulated signals. p.7 ℓ.6–10. The receiver may also be designed to combat inter-symbol interference ("ISI") in OFDM modulated signals. p.7 ℓ.6–10. The receiver includes an analog-to-digital (A\D) converter, transform module, and a detection module. p.6 ℓ.16–17; p.7 ℓ.11–13; p.8 ℓ.5–9; p.8 ℓ.15–p.9 ℓ.6. The A/D converter samples the corrupted OFDM-modulated signal to obtain a digital receive signal. p.6 ℓ.16–17. The transform module determines frequency component amplitudes of the digital receive signal. p.7 ℓ.11–13. The detection module determines a channel symbol from the frequency component amplitudes while compensating for correlation between the frequency components. p.7 ℓ.11–13; p.8 ℓ.5–9; p.8 ℓ.15–p.9 ℓ.6. In a preferred implementation, the detection module calculates for each frequency component, a weighted sum of the frequency component amplitudes from the transform module. p.10 ℓ.8–11. The weighted sum is preferably designed to minimize expected error energy observed by the decision element. p.10 ℓ.8–11.

Claim 1 recites a communications receiver that includes an analog-to-digital converter 26, a transform module (FIG.2 34; alternatively matched bandpass filters in p.7 ℓ.11–18), and a detection module (FIG.3 38 304). The analog-to-digital converter 26 samples a DMT (discrete multi-tone) signal to obtain a digital receive signal (FIG.2; p.6 ℓ.3–4). The transform module is coupled to the analog-to-digital converter 26 to determine amplitudes associated with frequency components of the digital receive signal. p.6 ℓ.7–8 ("Fourier Transform"); p.7 ℓ.11–18 ("matched bandpass filter outputs"). The detection module determines a channel symbol from the amplitudes

(FIGS. 3–5 38) while accounting for correlation **between the amplitudes** (p.7 ℓ.11–18; p.8 ℓ.5–9; p.8 ℓ.15–p.9 ℓ.6).

Claim 2 recites a communications receiver that includes an analog-to-digital converter that samples a discrete multi-tone ("DMT") signal to obtain a digital receive signal. p.6 ℓ.16–17. The receiver also includes a transform module coupled to the analog-to-digital converter and configured to determine amplitudes associated with frequency components of the digital receive signal. p.7 ℓ.11–13. The receiver further includes a detection module configured to determine a channel symbol from the frequency component amplitudes while accounting for correlation between the frequency component amplitudes of the digital receive signal. p.7 ℓ.13–14; p.8 ℓ.15–p.9 ℓ.6. The detection module determines the **most probable channel symbol given the amplitudes** determined by the transform module. p.9 ℓ.7–8.

Claim 3 recites a communications receiver that includes an analog-to-digital converter that samples a discrete multi-tone (DMT) signal to obtain a digital receive signal. p.6 ℓ.16–17. The receiver also includes a transform module coupled to the analog-to-digital converter and configured to determine amplitudes associated with frequency components of the digital receive signal. p.7 ℓ.11–13. The receiver further includes a detection module configured to determine a channel symbol from the frequency component amplitudes while accounting for correlation between the frequency component amplitudes of the digital receive signal. p.7 ℓ.13–14; p.8 ℓ.15–p.9 ℓ.6. The detection module includes a weighted sum unit associated with each frequency component, and each **weighted sum** unit combines amplitudes from the transform module in a manner designed to **minimize any error** between the output of the weighted sum unit and a valid output value. p.10 ℓ.8–11.

Claim 6 recites a communications receiver that includes an analog-to-digital converter that samples a DMT signal to obtain a digital receive signal. p.6 ℓ.16–17. The receiver also includes a transform module coupled to the analog-to-digital converter and configured to determine amplitudes associated with frequency components of the digital receive signal. p.7 ℓ.11–13. The receiver further includes a detection module configured to determine a channel symbol from the frequency component amplitudes while accounting for correlation between the frequency component amplitudes of the **digital receive signal**. p.7 ℓ.13–14; p.8 ℓ.15–p.9 ℓ.6. The receiver

also includes a time domain equalizer that operates on the digital receive signal to maximize a percentage of impulse response energy in a predetermined interval. p.6 ℓ.17–18.

Claim 19 recites a communications system that comprises a transmitter and a receiver. The transmitter transmits an OFDM modulated signal. FIG.1 10–20; p.5 ℓ.19–p.6 ℓ.8. The receiver receives and demodulates a corrupted version of the OFDM modulated signal. FIG.2 26–40; p.6 ℓ.6–10. The receiver includes an analog-to-digital converter 26, a transform module (FIG.2 34; alternatively matched bandpass filters in p.7 ℓ.11–18), and a detection module (FIG.3 38, 304). The analog-to-digital converter 26 samples a DMT (discrete multi-tone) signal to obtain a digital receive signal. FIG.2; p.6 ℓ.3–4. The transform module is coupled to the analog-to-digital converter 26 to determine amplitudes associated with frequency components of the digital receive signal. p.6 ℓ.7–8 ("Fourier Transform"); p.7 ℓ.11–18 ("matched bandpass filter outputs"). The detection module determines a channel symbol from the amplitudes (FIGS. 3–5 38) while accounting for correlation **between the amplitudes** (p.7 ℓ.11–18; p.8 ℓ.5–9; p.8 ℓ.15–p.9 ℓ.6).

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Appellants seek review of the following grounds of rejection:

Claims 1, 9, 11, 16, and 18 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over a conventional OFDM in view of Marchok (U.S. 6,285,654).

Claims 2–7, 12–15, and 17 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over a conventional OFDM in view of Marchok in further view of Aslanis (U.S. 6,359,933).

Claims 8 and 19 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over a conventional OFDM in view of Marchok in further view of Kumar (U.S. 5,748,677).

Claims 20–23 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over a convention OFDM in view of Marchok in further view of Kumar in even further view of Aslanis.

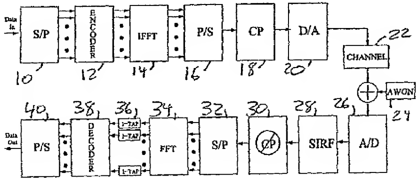
VII. ARGUMENT

The claims do not stand or fall together. Instead, appellants present separate arguments for various independent and dependent claims. After a concise discussion of cited art, each of these arguments is separately argued below and presented with separate headings and sub-headings as required by 37 CFR § 41.37(c)(1)(vii).

A. Discussion of the Cited Art

1. Conventional OFDM (U.S. 2002/0048333)

Figure 2 of the instant application depicts a conventional orthogonal frequency division multiplexer (OFDM). A conventional OFDM system conceptually comprises a serial-to-parallel (S/P) converter 10, an encoder 12, an inverse fast Fourier Transform (IFFT) module 14, a parallel-to-serial (P/S) converter 16, a cyclic prefix generator 18, a



digital-to-analog (D/A) converter 20, a channel 22, a noise source 24, an analog-to-digital (A\D) converter 26, a time-domain equalizer 28, a cyclic prefix remover 30, an S/P converter 32, a fast Fourier transform (FFT) module 34, a scaling mask 36, a decoder 38, and a P/S converter 40.

The transmitter accepts serial data and converts it into lower rate sequences via serial to parallel converter 10. These lower rate sequences are encoded by encoder 12 to give sequences of channel symbols, which are then frequency division multiplexed via an inverse fast Fourier Transform (IFFT) 14. The parallel outputs of the IFFT 14 are converted to serial form by P/S converter 16, and a cyclic prefix is added by generator 18. Transmission is then initiated by D/A

converter 20. The communications channel 22 distorts the signal as it transfers the signal to the receiver, and an additive white Gaussian noise (AWGN) source 24 corrupts the signal.

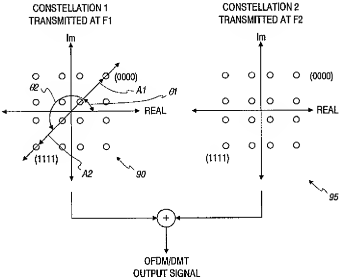
The receiver samples the received signal and converts it from analog to digital form via A/D converter 26. An equalizer 28 may be used to effectively shorten the impulse response of the overall channel, preferably to less than the length of the cyclic prefix. The cyclic prefix remover 30 drops the cyclic prefix, and S/P converter 32 converts the received sample stream into a set of reduced-rate sample streams. The FFT module 34 converts the reduced-rate sample streams into received channel symbol streams, which are then scaled in accordance with mask 36 and decoded by decoder 38 to obtain reduced-rate received data streams. The P/S converter 40 combines the reduced-rate received data streams into a single received data stream.

Practical OFDM systems employ a time domain equalizer 28 that is designed to make the length of the effective channel impulse response shorter than the cyclic prefix, but this typically results in significant energy leakage outside the cyclic prefix. As a result, neither inter-symbol interference (ISI) nor inter-channel interference (ICI) is eliminated, which severely degrades the system performance.

2. Marchok (U.S. 6,258,654)

Marchok utilizes OFDM/Discrete Multi Tone ("DMT") digital data modulation for exchanging communications data between a head end unit and remote service units. Col.3 ℓ.65–col.4 ℓ.1. Such OFDM/DMT digital data communications assign a particular amplitude, frequency, and phase for each transmitted "sub-symbol." Col.4 ℓ.1–31. The transmitted sub-symbol represents one or more information data bits that are to be transmitted between the units. Each sub-symbol may be represented by a point within a "constellation," the point being transmitted at a given carrier frequency or "bin". Col.4 ℓ.1–31.

FIG. 3 of Marchok illustrates the use of two constellations 90 and 95, each having sixteen constellation points that are capable of being transmitted within two separate frequency bins. Col.4 ℓ.1–31. As illustrated, a sub-symbol having a carrier signal of frequency f1 has its amplitude and phase varied depending on the constellation point that is to be transmitted. For example, a constellation point representing the binary state 0000 is transmitted as a sub-symbol at a phase of θ_1 and an amplitude of A_1 during a designated symbol time. A constellation point representing the binary state 1111, however, is transmitted as a sub-symbol at a phase of θ_2 and an amplitude of A_2 during a designated symbol time. Similarly, the second constellation 95, preferably having the same amplitude and phase designations for its sub-symbols as the first constellation 90, is used to modulate a second carrier frequency f2. The resulting modulated signals are combined into a single output symbol in which the individual sub-symbols are differentiated from one another based on their respective carrier frequencies or bins. Col.4 ℓ.1–31.

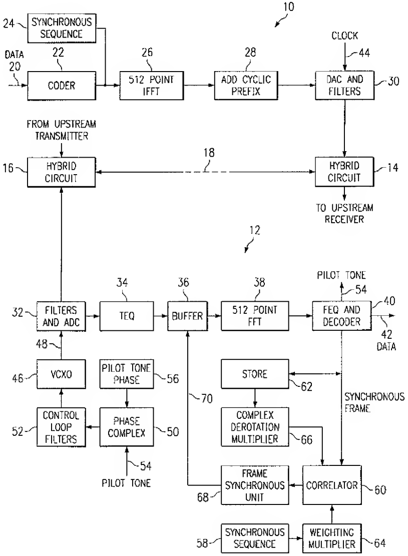


3. Aslanis (U.S. 6,359,933)

Referring to figure 1 of Aslanis, Aslanis discloses a multicarrier modulation transmission system receiver comprising: a Fast Fourier Transform (FFT) unit for transforming time domain values into complex amplitudes in the frequency domain; a buffer 36 for supplying received time domain values to the FFT unit 38 in accordance with a frame boundary; a correlator 60 for correlating complex amplitudes of a synchronizing frame of the system **with a synchronizing**

pattern stored (at 58) at the receiver to produce a correlation result; and a control unit responsive to the correlation result being below a threshold value to adjust the frame boundary by a time shift determined by performing a plurality of correlations between **the stored synchronizing pattern** 58 and the complex amplitudes in each case multiplied by a respective complex value representing a respective complex derotation of the complex amplitudes corresponding to a respective time shift of the synchronizing frame, and selecting the best correlation result. Col.3 ℓ.28–45.

FIG. 1



4. Kumar (U.S. 5,748,677)

In describing the composite signal demodulator 39 (FIG.3 below) of the prior art, Kumar describes two illustrative implementations. Col.11 ℓ.32–52. In an implementation for an OFDM system, the composite signal demodulator 39 employs a Fast Fourier Transform to perform subcarrier demodulation. Col.11 ℓ.41–46. In an implementation for a multiplexed spread spectrum system, the composite signal demodulator 39 employs a (time domain) spreading signal correlator for each subcarrier. Col.11 ℓ.46–52.

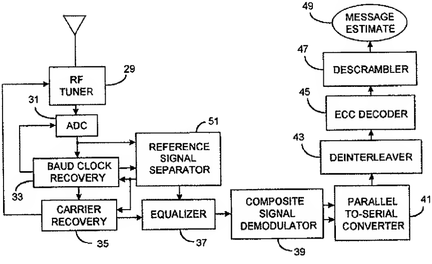


FIG. 3 (PRIOR ART)

B. Rejections Under 35 U.S.C. § 103(a)

Claims 1–9 and 11–23 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over various references. Appellants respectfully traverse because the cited art fails to establish a *prima facie* case of obviousness.

> To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations.

MPEP § 2143. Specifically, appellants traverse because the cited art fails to teach or suggest every limitation of the claims.

1. Claims 1, 9, 11, 16, and 18

Claims 1, 9, 11, 16, and 18 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over appellant's admitted prior art (hereinafter "conventional OFDM") in view of Marchok (U.S. 6,285,654). Appellants respectfully traverse because the cited art fails to teach or suggest every limitation of the claims.

Claim 1 recites in part "a detection module configured to determine a channel symbol from the frequency component amplitudes while accounting for correlation between the frequency component amplitudes of the digital receive signal." Claim 11 recites a similar limitation. Examiner admits this limitation does not appear in a conventional OFDM, and cites Marchok FIG.6, 125; col.3 ℓ.66–67; col.4 ℓ.1–30; col.7 ℓ.62–67; and col.8 ℓ.1–23 as teaching this limitation. However, the cited portion of Marchok merely describes an OFDM/DMT modulation scheme in which data is transmitted using multiple constellations in different frequency bins. At col.4 ℓ.62–col.5 ℓ.13, Marchok advocates a selective decoding strategy in which receivers decode only a subset of the frequency bins. Such a decoding strategy is based on frequency bin independence. Hence, Marchok fails to teach or suggest a decoding strategy that accounts for correlation between frequency component amplitudes of the signal. For at least this reason, claims 1 and 11 along with their dependent claims 9, 16, and 18 are allowable over the cited art.

2. Claims 2–7, 12–15, and 17

Claims 2–7, 12–15, and 17 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over a conventional OFDM in view of Marchok in further view of Aslanis. Appellants respectfully traverse because the cited art fails to teach or suggest every limitation of the claims.

Claims 2–7 depend from claim 1, and (because Aslanis fails to cure the already noted deficiencies of the cited art) are allowable for at least the same reason as claim 1. Similarly, claims 12–15 and 17 depend from claim 11, and are allowable for at least the same reason as claim 11.

In addition, claim 2 recites in part "the detection module determines the most probable channel symbol given the [frequency component] amplitudes determined [from the receive signal] by the transform module." Claim 12 recites a similar limitation. Examiner admits this limitation is not disclosed in a conventional OFDM or Marchok, and cites Aslanis FIG.1, 60, 68, 40; col.3 ℓ.28–45; and col.9 ℓ.35–39 as teaching this limitation. However, the cited material fails to teach or suggest a maximum likelihood or maximum probability technique for determining a channel symbol solely from frequency domain amplitudes of the received signals. Rather, Aslanis only teaches correlating frequency components of the receive signal with a **predetermined** synchronization sequence already in memory. *See* Aslanis FIG.1, 58 and 60; col.8 ℓ.25–44 ("these synchronizing frame contents are also supplied . . . to the correlator 60 where they are correlated with the synchronizing sequence from the store 58"); col.3 ℓ.34–36 ("correlating complex amplitudes of a synchronizing frame of the system with a synchronizing pattern stored at the receiver"); col.7 ℓ.35–37 ("receiver 12 includes a synchronizing sequence source 58 which corresponds to and produces the same synchronizing sequence as the source"); col.7 ℓ.44–46 ("synchronizing sequence from the source 58 is supplied to the correlator"). There is no teaching that the frequency components of the receive signal are correlated among themselves and no suggestion that such correlation should be identified and removed. For at least this additional reason, claims 2 and 12 are allowable over the cited art.

In addition, claim 3 recites in part "a weighted sum unit associated with each frequency component [of the digital receive signal]". Claim 13 recites a similar limitation. Examiner cites

Aslanis at FIG.1, 60, 40; col.10 ℓ.62–67; and col.11 ℓ.1–17 as teaching this limitation. However, the cited material teaches weighting the "complex amplitudes of the synchronizing sequence **supplied from the store** 58 via the weighting multiplier 64 . . . ." Because weighting a signal supplied from memory does not teach or suggest weighting the received signal, claims 3 and 13 are allowable over the cited art.

In addition, claim 6 recites in part "a time domain equalizer that operates on the digital receive signal to maximize a percentage of impulse response energy in a predetermined interval." Examiner cites Aslanis at col.5 ℓ.17–25 as teaching this limitation. However the cited material teaches limiting most of the impulse response rather than maximizing a percentage of impulse response in a predetermined interval. For at least this additional reason, claim 6 is allowable over the cited art.

3. Claims 8 and 19

Claims 8 and 19 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over a conventional OFDM in view of Marchok in further view of Kumar (U.S. 5,748,677). Appellants respectfully traverse because the cited art fails to teach or suggest every limitation of the claims.

Claim 8 depends from claim 1, and (because Kumar does not cure the already noted deficiencies of the cited art) is allowable for at least the same reason as claim 1.

Claim 19 recites a limitation similar to that of claim 1: "a detection module configured to determine a channel symbol from the frequency component amplitudes while accounting for correlation between the frequency component amplitudes of the digital receive signal." The additional reference, Kumar, is not cited against this limitation. Therefore the reasoning of claim 1 above fully applies, and claim 19 is allowable over the cited art.

4. Claims 20–23

Claims 20–23 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over a conventional OFDM in view of Marchok in further view of Kumar in even further view of Aslanis. Appellants respectfully traverse because the cited art fails to teach or suggest every limitation of the claims.

Claims 20–23 depends from claim 19, and (because Aslanis fails to cure the already noted deficiencies of the cited art) is allowable for at least the same reason as claim 19.

In addition, claim 20 recites a limitation similar to that of claim 2: "wherein the detection module determines the most probable channel symbol given the amplitudes determined by the transform module." The additional reference, Kumar, is not cited against this limitation. Therefore the reasoning of claim 2 above fully applies, and claim 20 is allowable over the cited art.

In addition, claim 21 recites a limitation similar to that of claim 3: "a weighted sum unit associated with each frequency component, wherein each weighted sum unit combines a plurality of amplitudes from the transform module in a manner designed to minimize any error between the output of the weighted sum unit and a valid output value." The additional reference, Kumar, is not cited against this limitation. Therefore the reasoning of claim 3 above fully applies, and claim 21 is allowable over the cited art.

C. Conclusion

For the reasons stated above, appellants respectfully submit that the rejections should be reversed. Appellants believe that they have complied with each requirement for an appeal brief. If any member of the Board of Appeals has any questions or otherwise feels it would be advantageous, he or she is encouraged to telephone the undersigned at (713) 238-8055.

In the course of the foregoing discussions, appellants may have at times referred to claim limitations in shorthand fashion, or may have focused on a particular claim element. This discussion should not be interpreted to mean that the other limitations can be ignored or dismissed. The claims must be viewed as a whole, and each limitation of the claims must be considered when determining the patentability of the claims. Moreover, it should be understood that there may be other distinctions between the claims and the prior art which have yet to be raised, but which may be raised in the future.

If any fees are inadvertently omitted or if any additional fees are required or have been overpaid, please appropriately charge or credit those fees to Conley Rose, P.C. Deposit Account Number 03-2769/1789-04801/HDJK.

Respectfully submitted,

Daniel J. Krueger
Reg. No. 42,771
Attorney for appellants
Conley Rose, P.C.
P.O. Box 3267
Houston, Texas 77253-3267
Ph: (713) 238-8000

VIII. CLAIMS APPENDIX

1. (Previously presented) A communications receiver that comprises:

an analog-to-digital converter that samples a DMT (discrete multi-tone) signal to obtain a digital receive signal;

a transform module coupled to the analog-to-digital converter and configured to determine amplitudes associated with frequency components of the digital receive signal; and

a detection module configured to determine a channel symbol from the frequency component amplitudes while accounting for correlation between the frequency component amplitudes of the digital receive signal.

2. (Original) The receiver of claim 1, wherein the detection module determines the most probable channel symbol given the amplitudes determined by the transform module.

3. (Original) The receiver of claim 1, wherein the detection module includes:

a weighted sum unit associated with each frequency component, wherein each weighted sum unit combines a plurality of amplitudes from the transform module in a manner designed to minimize any error between the output of the weighted sum unit and a valid output value.

4. (Original) The receiver of claim 1, wherein the detection module determines the channel symbol that corresponds to a matrix product of a matrix M and a vector of amplitudes from the transform

module, wherein the matrix M minimizes a square of an expected error between the channel symbol and valid channel symbols.

5. (Original) The receiver of claim 1, wherein the detection module includes:

a subtraction module that removes trailing intersymbol interference from the output of the transform module to obtain ISI-corrected frequency component values;

a decision unit that determines a matrix product of a matrix M and a vector of ISI-corrected frequency component values to obtain the channel symbol; and

a feedback module that determines a matrix product of a matrix T and the channel symbol from the decision unit to provide the trailing intersymbol interference to the subtraction module.

6. (Original) The receiver of claim 1, further comprising:

a time domain equalizer that operates on the digital receive signal to maximize a percentage of impulse response energy in a predetermined interval.

7. (Original) The receiver of claim 1, further comprising:

a cyclic prefix remover that removes prefixes from the digital receive signal, each prefix being associated with a respective channel symbol.

8. (Original) The receiver of claim 1, further comprising:

an error correction code decoder that decodes channel symbols received from the detection module.

9. (Original) The receiver of claim 1, wherein the transform module performs a fast Fourier Transform (FFT) on the receive signal in each channel symbol interval.

10. (Previously presented) A communications receiver that comprises:

an analog-to-digital converter that samples a DMT (discrete multi-tone) signal to obtain a digital receive signal;

a transform module coupled to the analog-to-digital converter and configured to determine amplitudes associated with frequency components of the digital receive signal; and

a detection module configured to determine a channel symbol from the amplitudes while accounting for correlation between the amplitudes,

wherein the transform module includes a bank of matched bandpass filters.

11. (Previously presented) A method of receiving OFDM (orthogonal frequency division multiplexing) modulated data, wherein the method comprises:

determining a set of frequency component amplitudes associated with a channel symbol interval of a receive signal; and

determining a channel symbol associated with the set of frequency component amplitudes while accounting for correlation between the frequency component amplitudes associated with the channel symbol interval of the receive signal.

12. (Original) The method of claim 11, wherein said determining a channel symbol includes:

identifying a channel symbol that is most probably correct given the set of frequency component amplitudes.

13. (Original) The method of claim 11, wherein said determining a channel symbol includes:

for each frequency component:

calculating a weighted sum of frequency component amplitudes that minimizes expected error energy of the frequency component.

14. (Previously presented) A method of receiving OFDM (orthogonal frequency division multiplexing) modulated data, wherein the method comprises:

determining a set of frequency component amplitudes associated with a channel symbol interval of a receive signal; and

determining a channel symbol associated with the set of frequency component amplitudes while accounting for correlation between the frequency component amplitudes associated with the channel symbol interval of the receive signal, wherein said determining a channel symbol includes:

determining a product of a matrix M and the set of frequency component amplitudes, wherein the matrix M includes at least two non-zero values in each row.

15. (Original) The method of claim 11, wherein said determining a channel symbol includes:

subtracting intersymbol interference from the set of frequency component amplitudes to obtain an ISI-corrected set of frequency component amplitudes;

determining a product of a matrix M and the ISI-corrected set of frequency component amplitudes to obtain the channel symbol; and

determining a product of a matrix T and the channel symbol to obtain the intersymbol interference in a subsequent set of frequency component amplitudes.

16. (Original) The method of claim 11, further comprising:

processing the receive signal to shorten the effective channel impulse response before performing said determining a set of frequency component amplitudes.

17. (Original) The method of claim 11, further comprising:

removing a prefix from each symbol interval of the receive signal before performing said determining a set of frequency component amplitudes.

18. (Original) The method of claim 11, wherein said determining a set of frequency component amplitudes includes:

converting the receive signal into digital form; and

performing a fast Fourier Transform on the digital receive signal.

19. (Previously presented) A communications system that comprises:

a transmitter that transmits an OFDM modulated signal; and

a receiver that receives and demodulates a corrupted version of the OFDM modulated signal, wherein the receiver includes:

an analog-to-digital converter that samples the corrupted OFDM-modulated signal to obtain a digital receive signal;

a transform module coupled to the analog-to-digital converter and configured to determine amplitudes associated with frequency components of the digital receive signal; and

a detection module configured to determine a channel symbol from the frequency component amplitudes while accounting for correlation between the frequency component amplitudes of the digital receive signal.

20. (Original) The system of claim 19, wherein the detection module determines the most probable channel symbol given the amplitudes determined by the transform module.

21. (Original) The system of claim 19, wherein the detection module includes:

a weighted sum unit associated with each frequency component, wherein each weighted sum unit combines a plurality of amplitudes from the transform module in a manner designed to minimize any error between the output of the weighted sum unit and a valid output value.

22. (Original) The system of claim 19, wherein the detection module determines the channel symbol that corresponds to a matrix product of a matrix M and a vector of amplitudes from the transform module, wherein the matrix M minimizes a square of an expected error between the channel symbol and valid channel symbols.

23. (Original) The system of claim 19, wherein the detection module includes:

a subtraction module that removes trailing intersymbol interference from the output of the transform module to obtain ISI-corrected frequency component values;

a decision unit that determines a matrix product of a matrix M and a vector of ISI-corrected frequency component values to obtain the channel symbol; and

a feedback module that determines a matrix product of a matrix T and the channel symbol from the decision unit to provide the trailing intersymbol interference to the subtraction module.

IX. EVIDENCE APPENDIX

None.

X. RELATED PROCEEDINGS APPENDIX

None.